

FIG.1

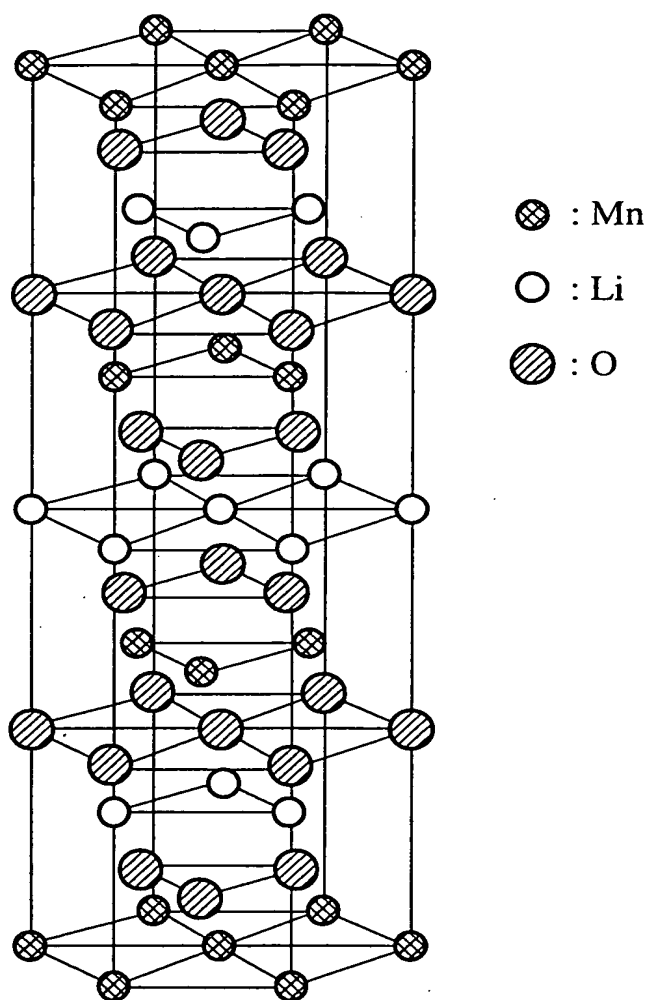


FIG.2

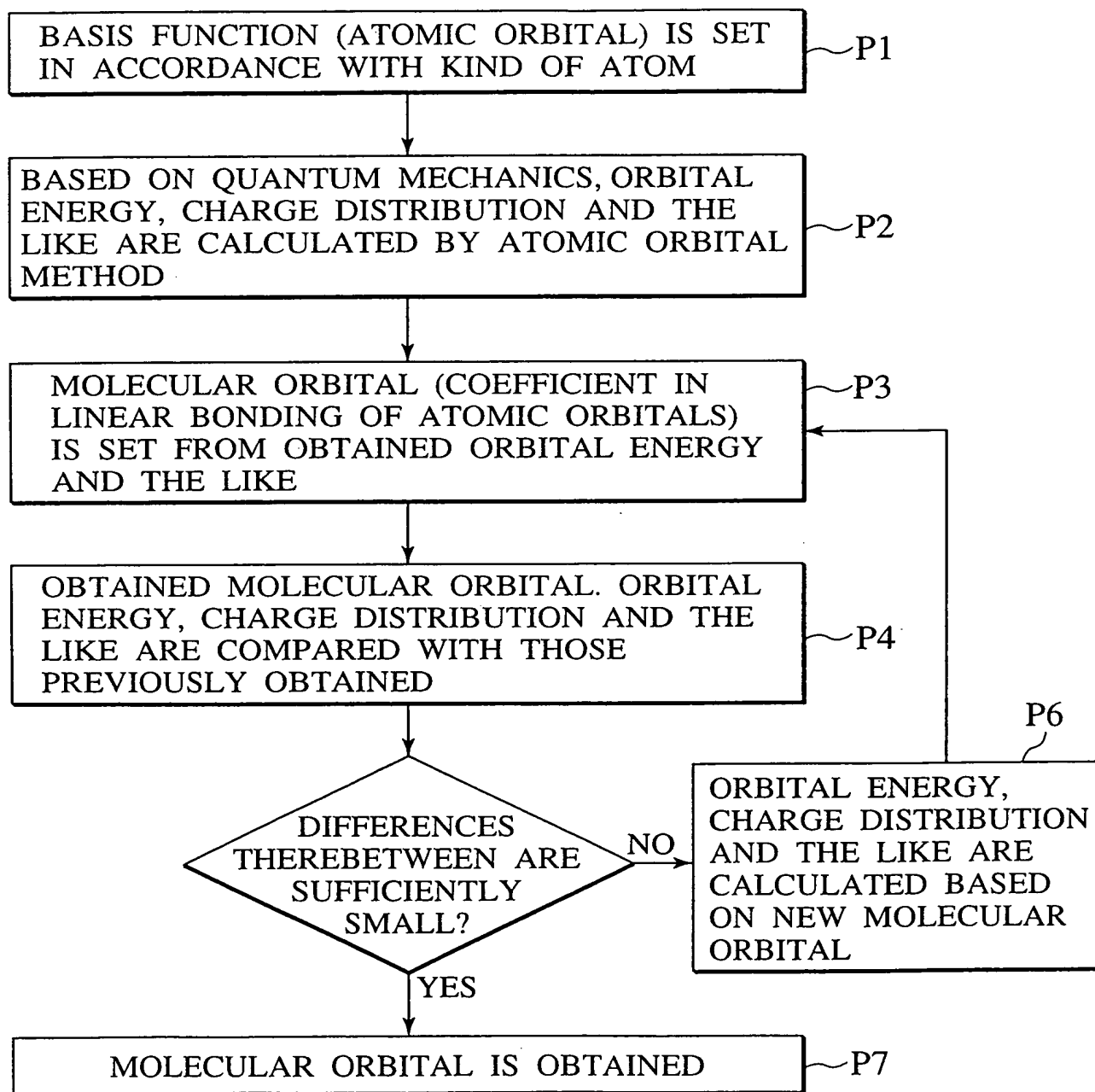


FIG.3

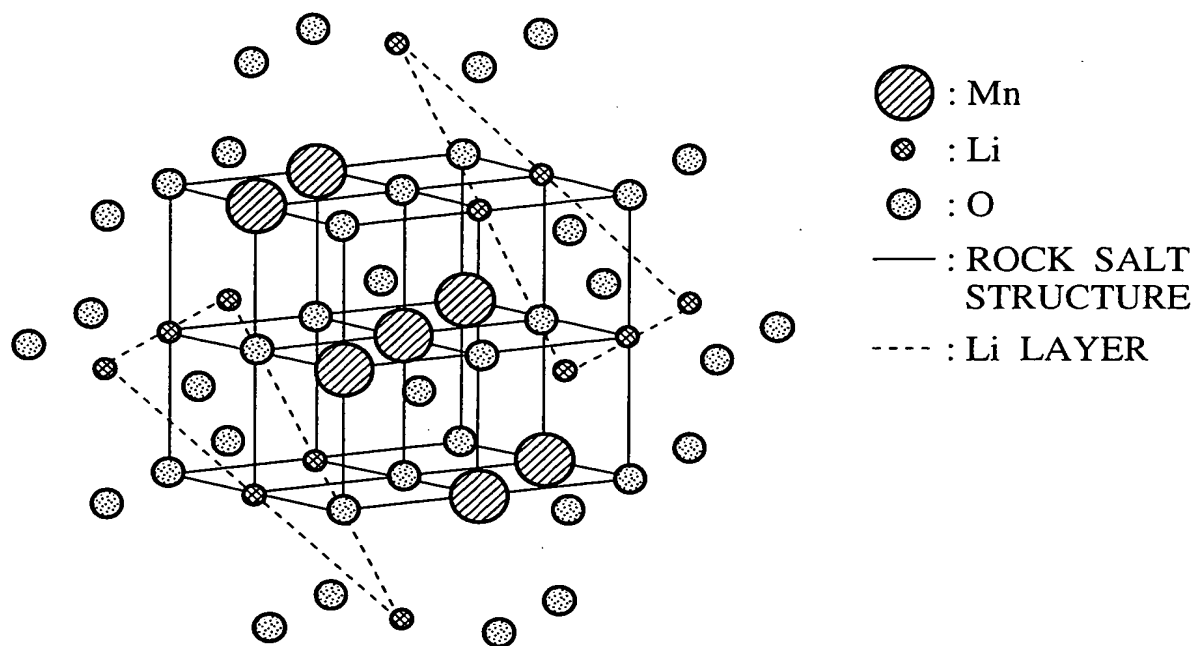


FIG.4

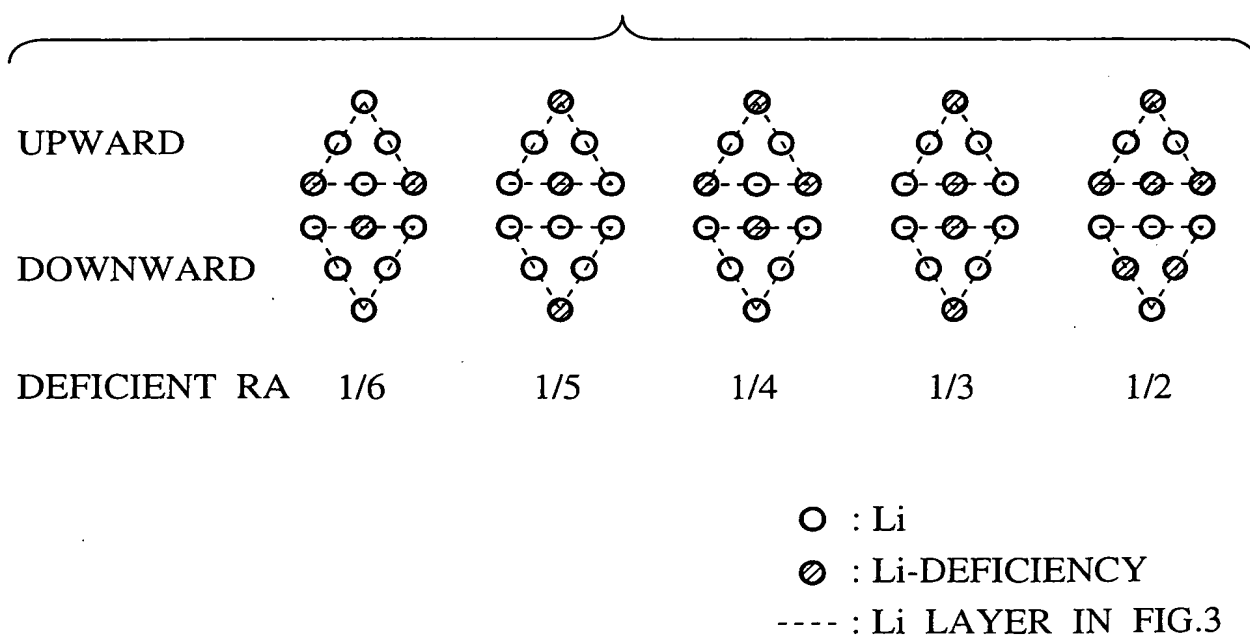


FIG.5

	Mole ratio of each element in positive electrode material		Composition of positive electrode	Theoretical capacity (mAh/g)	BOP (-)	Relative BOP (-)
	Li	Mn				
Example 1	0.75 (x=1/4)	1.00	Li <sub>0.75</sub> MnO <sub>2</sub> - $\delta$	222	0.23	1.28
Example 2	0.7 (x=3/10)	1.00	Li <sub>0.7</sub> MnO <sub>2</sub> - $\delta$	207	0.23	1.28
Example 3	0.67 (x=1/3)	1.00	Li <sub>0.67</sub> MnO <sub>2</sub> - $\delta$	197	0.23	1.28
Example 4	0.6 (x=2/5)	1.00	Li <sub>0.5</sub> MnO <sub>2</sub> - $\delta$	178	0.24	1.33
Comparative example 1	0.5 (x=1/2)	1.00	Li <sub>0.5</sub> MnO <sub>2</sub> - $\delta$	148	0.24	1.33
Comparative example 2	1.00	1.00	LiMnO <sub>2</sub> - $\delta$	296	0.18	1.00
Comparative example 3	0.83 (x=1/6)	1.00	Li <sub>0.83</sub> MnO <sub>2</sub> - $\delta$	247	0.21	1.17
Comparative example 4	0.8 (x=1/5)	1.00	Li <sub>0.8</sub> MnO <sub>2</sub> - $\delta$	237	0.21	1.17

FIG.6

	Mole ratio of each element in positive electrode material				Composition of positive electrode	BOP (-)	Relative BOP (-)
	Li	Mn	Fe	Ni			
Example 5	0.75	0.67	0.33	0	Li <sub>0.76</sub> Mn <sub>0.67</sub> Fe <sub>0.33</sub> O <sub>2-δ</sub>	0.23	1.28
Example 6	0.75	0.67	0	0.33	Li <sub>0.75</sub> Mn <sub>0.67</sub> Ni <sub>0.33</sub> O <sub>2-δ</sub>	0.24	1.33
Example 7	0.75	0.75	0.25	0	Li <sub>0.75</sub> Mn <sub>0.75</sub> Fe <sub>0.25</sub> O <sub>2-δ</sub>	0.24	1.33
Example 8	0.75	0.75	0	0.25	Li <sub>0.75</sub> Mn <sub>0.75</sub> Ni <sub>0.25</sub> O <sub>2-δ</sub>	0.24	1.33
Example 9	0.67	0.67	0.33	0	Li <sub>0.67</sub> Mn <sub>0.67</sub> Fe <sub>0.33</sub> O <sub>2-δ</sub>	0.24	1.33
Example 10	0.67	0.67	0	0.33	Li <sub>0.67</sub> Mn <sub>0.67</sub> Ni <sub>0.33</sub> O <sub>2-δ</sub>	0.24	1.33

FIG.7

	Composition of positive electrode	Theoretical capacity / (mAh/g)	BOP (-)	Relative BOP (-)
Example 11	$\text{Li}_{0.75}\text{Mn}_{0.67}\text{Cr}_{0.33}\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	222	0.238	1.32
Example 12	$\text{Li}_{0.75}\text{Mn}_{0.67}\text{Co}_{0.33}\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	222	0.235	1.31
Example 13	$\text{Li}_{0.75}\text{Mn}_{0.33}(\text{Cr}_{0.5}\text{Co}_{0.5})0.67\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	222	0.239	1.33
Example 14	$\text{Li}_{0.75}\text{Mn}_{0.5}(\text{Cr}_{0.8}\text{Al}_{0.2})0.5\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	222	0.240	1.33
Example 15	$\text{Li}_{0.75}\text{Mn}_{0.5}(\text{Cr}_{0.4}\text{Co}_{0.4}\text{Al}_{0.2})0.5\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	222	0.242	1.34
Comparative example 5	$\text{Li}_{0.8}\text{Mn}_{0.67}\text{Cr}_{0.33}\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	237	0.213	1.18
Comparative example 6	$\text{Li}_{0.67}\text{Mn}_{0.37}\text{Co}_{0.33}\text{O}_2-\delta$ ( $\delta \leq 0.2$ )	197	0.236	1.31

FIG.8

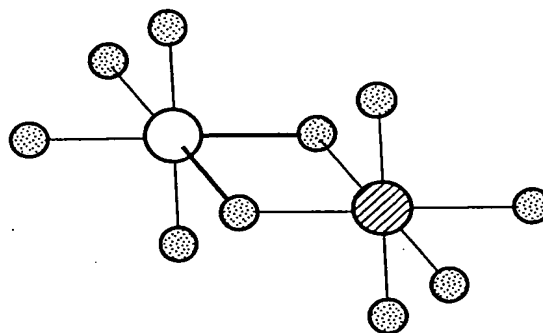
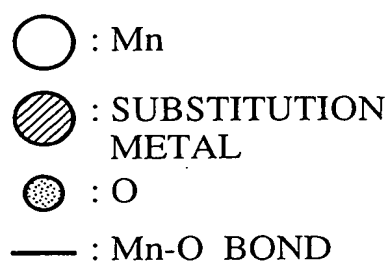


FIG.9

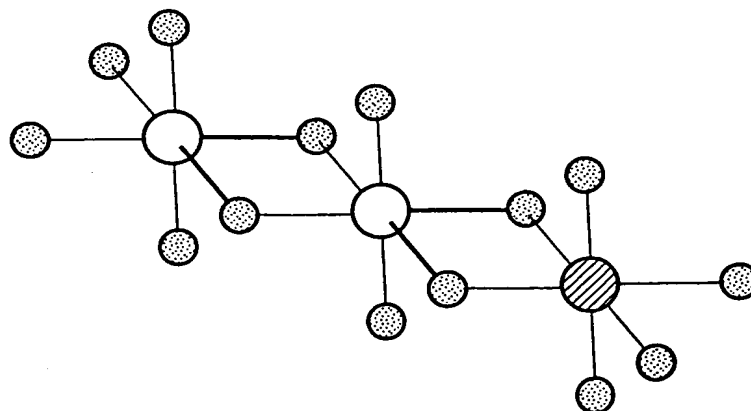
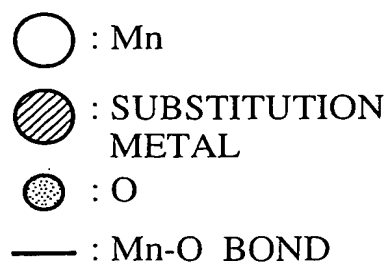
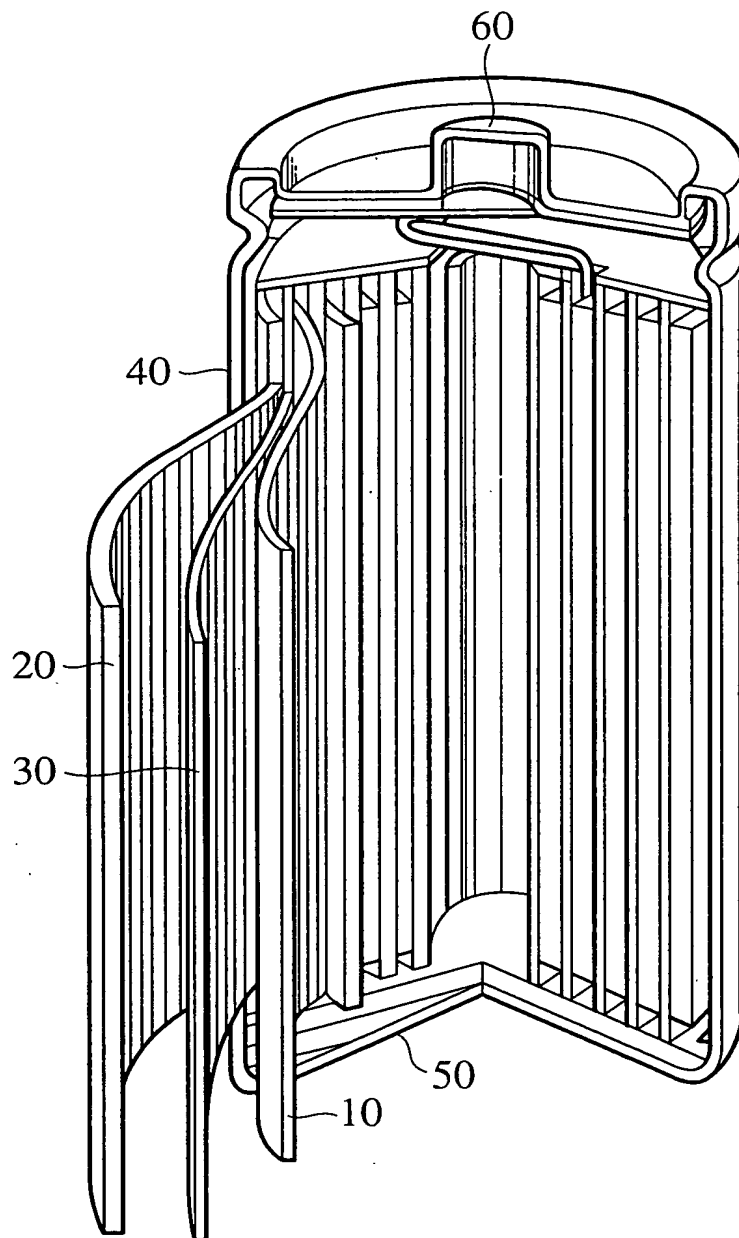


FIG.10

	Mole ratio of each element in positive electrode material		Composition of positive electrode	Relative BOP (-)
	Mn	Substitution metal		
Example 16	0.5 (y=1/2)	Cr, 0.5	$\text{Li}_{1-x}\text{Mn}_{0.5}\text{Cr}_{0.5}\text{O}_{2-\delta}$	2.61
Example 17	0.5(y=1/2)	Fe, 0.5	$\text{Li}_{1-x}\text{Mn}_{0.5}\text{Fe}_{0.5}\text{O}_{2-\delta}$	1.57
Example 18	0.5 (y=1/2)	Ni, 0.5	$\text{Li}_{1-x}\text{Mn}_{0.5}\text{Ni}_{0.5}\text{O}_{2-\delta}$	1.11
Comparative example 7	1.0 (y=1)	0	$\text{Li}_{1-x}\text{MnO}_{2-\delta}$	1.00
Comparative example 8	0.5 (y=1/2)	Co, 0.5	$\text{Li}_{1-x}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_{2-\delta}$	0.71
Example 19	0.67 (y=1/3)	Cr, 0.33	$\text{Li}_{1-x}\text{Mn}_{0.67}\text{Cr}_{0.33}\text{O}_{2-\delta}$	2.61
Example 20	0.67 (y=1/3)	Fe, 0.33	$\text{Li}_{1-x}\text{Mn}_{0.67}\text{Fe}_{0.33}\text{O}_{2-\delta}$	1.97
Example 21	0.67 (y=1/3)	Ni, 0.33	$\text{Li}_{1-x}\text{Mn}_{0.67}\text{Ni}_{0.33}\text{O}_{2-\delta}$	2.12
Comparative example 9	1.0 (y=1)	0	$\text{Li}_{1-x}\text{MnO}_{2-\delta}$	1.00
Comparative example 10	0.67 (y=1/3)	Co, 0.33	$\text{Li}_{1-x}\text{Mn}_{0.67}\text{Co}_{0.33}\text{O}_{2-\delta}$	0.96



FIG.11



099339-0501  
TOSTRO 65E62660

FIG.12A

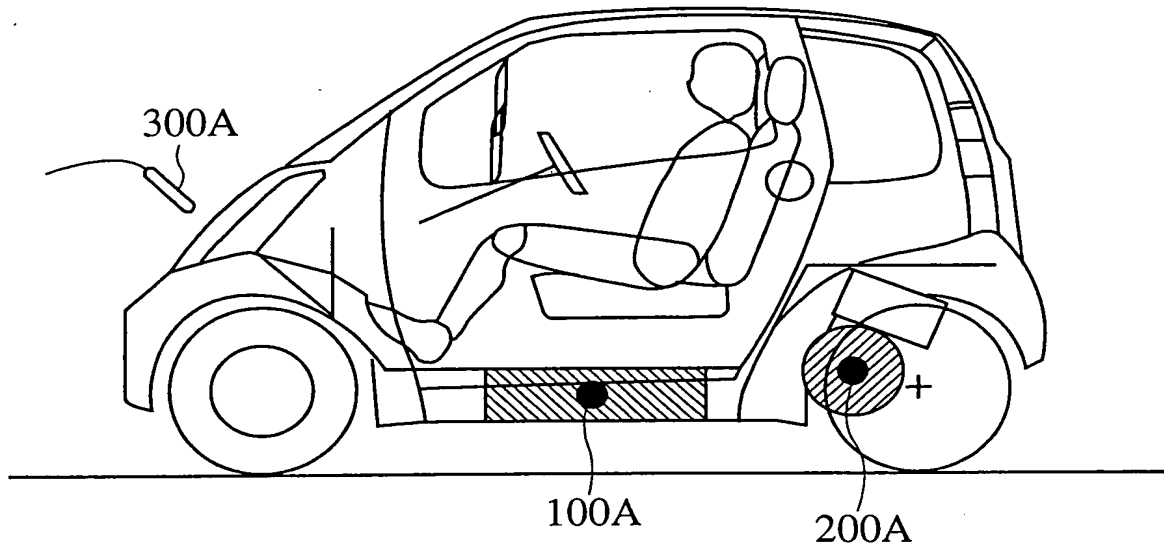


FIG.12B

